# Those bug-eating connoisseurs are a bit batty

LLNL's wild side

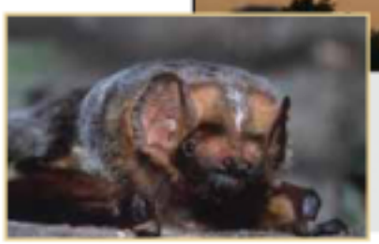
By Jim Woollett

Although bats don't normally fit into the "good looks" category for mammals, their lack of exterior charm is compensated for by the vital role they play as bug-eating connoisseurs. A single bat may consume more than 3,000 insects in a night-time foray, thereby keeping our human world considerably more "bug-free." Multiply the number of bugs consumed by each bat by the 925 different species that exist worldwide and one starts to gain an idea of their ecological value on a landscape level.

*Chiroptera*, the scientific order for bats, means "winged hand" and this mystical title is apropos as many species of bat are barely understood and their natural history remains undocumented to date.

Twenty different bat species occur in California and each has its own unique life requirements and social organization. In the region surrounding LLNL, 15 kinds of bats are known to live, but the following 4 species are most likely to be encountered onsite (as they forage for dinner in the late evenings): Pallid Bat *(Antrozous pallidus)*, Mexican Free-Tailed Bat *(Tadarida brasiliensis)*, Hoary Bat *(Lasiurus cinereus)*, Western or Townsend's Big-Eared bat *(Corynorhinus townsendii)*.

The following sections highlight life history information for each of these species. Additionally, a recent acoustic survey for bat presence at Site 300 collected a sonic "signature call" for a Pallid Bat. Every bat species has a different signature call and these calls can be used to identify bat presence and use in an area.



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**Left: Close up of a Hoary Bat. Center: Mexican Free-Tailed Bat colony flying away from roost. Top right: Townsend Big-Eared Bat colony roost in a cave. Bottom right: Pallid Bat.**

***Pallid Bat — State and federal special-status species***

This bat is widely distributed in California and found in diverse habitats from sea level to above 2000 meters in the Sierras. Although encountered roosting in or around buildings, bridges and other man-made structures, in this area it is most associated with oak/grassland habitats. These natural settings typically have a variety of caves, rock crevices and tree hollows for roosting. Colony size is typically comprised of 50-300 individuals. These bats often feed on large, ground-dwelling arthropods (e.g., scorpions, Jerusalem crickets).

***Mexican Free-tailed Bat — No state or federal status***

This is the most common bat in lowland areas of California. These bats roost in aggregations within crevices or cavities; they will also use human structures. Colonies are capable of being quite mobile and will utilize other roosts if disturbed or seasonally involved in interdistal movements. Most roosting colonies in California consist of several hundred to several thousand bats. They are not known to hibernate during the winter but undergo periods of torpor or brief inactivity during cold weather periods. Mexican free-tailed bats are aerial foragers and feed on a variety of flying insects. Because of this species' abundance, they may have an economically significant effect on local agricultural pests (i.e., insects). This species is known for foraging at considerable heights above ground. Recorded visual observations have shown that they may prefer to take insects (e.g., midges mosquitoes, water boatmen) above water sources and outdoor lighting. These forays may be several hundred feet above these features.

***Hoary Bat — No state or federal status***

This bat is a non-colonial, foliage roosting species that forages along river and stream corridors, over open water bodies (i.e., the Central Retention Basin at LLNL) and over meadows and forest canopies. It also prefers moths as a food source. Studies suggest that nearly all summer residents are males or non-reproductive females. Most young are raised in southern Canada and the U.S. Great Plains. Long distance migrations occur to the California coast in the fall and include both male and female genders. Other data suggests that daytime flights of Hoary Bats through the Central Valley in both the spring and fall could occur infrequently.

***Western or Townsend's Big-eared Bat — State and federal special-status species***

This is another broadly distributed bat species in California with records of presence ranging from the margins of the Central Valley to all elevations in the Coast Ranges and moderately high elevations in the Sierra Nevadas. This species is an obligate cave-dweller that is largely reliant on the natural rock caves and abandoned mines for maternity roosts and reproduction. It tends to hang on open surfaces and in clusters within cave systems. Shallow caves can be occupied if their heights are greater than 2 meters, which is important in avoiding discovery by snakes and other terrestrial predators.

Maternity colonies are normally between 25-300 individuals. Studies indicate that this bat feeds mostly on moths and forages along vegetated creek drainages and in proximal forested areas. Big-eared bat echolocation calls are of low intensity and are rarely detected by acoustic recorders away from roost sites.

Roost sites are crevices, cavities and foliage. Some species, like the foliage-roosting red bat, do not form large colonies; others like Mexican free-tailed and Yuma myotis form colonies from 100 to several thousand individuals. Natural features and human-built structures may serve as roost sites. Temporary aggregation sites are known to be used during spring and Fall for migrating animals. Refuges for hibernating animals in the winter are extremely important for survival.

Bats may roost at night while consuming prey or joining larger aggregations of individuals (including other species). These sites need to offer protection from predators and thermal buffering against air temperature declines throughout the night.

All bat species are insectivorous. At night, bats concentrate over and near areas with perennial water. Movements of several kilometers one way to a foraging site have been recorded for radio-tagged bats. Daily waterloss may constitute 15-20 perecent of their total body weight during the summer; drinking while flying over a water source is the typical method used to rehydrate.